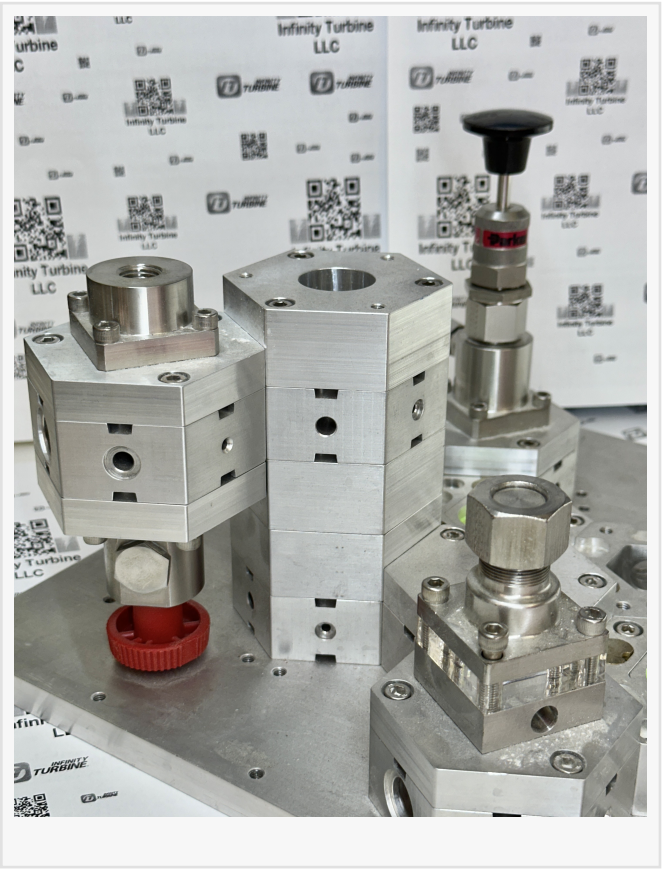
Infinity Turbine Introduces Revolutionary Pulsed Supercritical Heat Pump for Efficient Data Center GPU Cooling

The Pulsed Supercritical Heat Pump is set to revolutionize the data center industry by providing a cost-effective, efficient, cooling solutions from waste heat.



MADISON, WI, UNITED STATES, October 14, 2024 /EINPresswire.com/ -- Infinity Turbine, a leader in cutting-edge energy solutions, is proud to unveil the Pulsed Supercritical Heat Pump, a breakthrough technology designed to revolutionize the cooling of high-performance GPUs in data centers. This new heat pump system, which features no moving parts, offers unprecedented efficiency and reliability in thermal management, marking a significant leap forward in cooling technology for modern data centers utilizing GPU waste heat.

A New Era in Data Center Cooling

As data centers grow in size and computational capacity, cooling becomes a critical challenge, especially for high-performance GPUs such as the Nvidia A100, which generate massive amounts of heat. Traditional air and water cooling systems are becoming less effective and increasingly expensive to operate at scale. The new Pulsed Supercritical Heat Pump from Infinity Turbine solves these issues by harnessing supercritical CO2 to provide superior cooling performance.

The Pulsed Supercritical Heat Pump leverages the power of supercritical CO2 to efficiently absorb and transfer heat away from GPU chips, offering a highly efficient, self-sustaining cooling system with no mechanical components. The system's use of pulsed pressure drops creates rapid cooling in a continuous loop, providing a cutting-edge solution for managing heat in dense data centers.

How the Pulsed Supercritical Heat Pump Works

The Pulsed Supercritical Heat Pump utilizes liquid CO2, which is heated by the waste heat generated by the GPUs in a data center. As the CO2 heats up, it transitions into its supercritical phase, where it behaves like both a gas and a liquid, enabling it to absorb large amounts of heat.

The closed-loop process works as follows:
1. Liquid CO2 enters a heat exchanger, where it absorbs waste heat from Nvidia A100 GPUs.
2. The CO2 is heated to a supercritical state (above 31°C and 73.8 bar) and is then passed through an ejector pump system, creating a pulsed pressure drop that provides rapid and efficient cooling.
3. The CO2 expands, causing a temperature drop that cools the GPUs significantly.
4. The cooled CO2 is cycled back through the system in a continuous loop, offering consistent and effective heat management without the need for moving parts or complex mechanical components.
5. A portion of the pressure is used to pump liquid CO2 into the next GPU heat exchanger, cascading the system (equilibrium is never reached).

The waste heat from the GPU is about 1,024 BTU/hour (40-60 C). From 80 bar to 10 bar, CO2 can cool to temperatures as low as -10°C to -20°C (14°F to -4°F), depending on the specific expansion process. By utilizing the waste heat from an Nvidia A100 chip, CO2 can be heated to a supercritical state. When expanded through an ejector, this results in a significant pressure drop and cooling effect, with temperatures dropping to around -10°C to -20°C depending on the expansion. This cooling can be highly effective for further heat management in a data center environment, providing a highly efficient method to recover and reuse waste heat for GPU cooling.

The system's unique use of one-way valves—which have no moving parts—ensures a continuous, reliable flow of CO2 through the heat exchangers, preventing back pressure and ensuring maximum cooling efficiency.

Key Benefits of the Pulsed Supercritical Heat Pump

1. No Moving Parts: The Pulsed Supercritical Heat Pump's solid-state design eliminates the need for pumps, compressors, or mechanical valves, drastically reducing maintenance costs and improving system reliability.

2. Energy Efficiency: By using supercritical CO2 and leveraging the Joule-Thomson effect, the system cools GPUs more efficiently than traditional air or water cooling methods. Data centers can reduce cooling energy consumption by up to 50%, resulting in substantial cost savings.

3. Scalable Design: The compact design and scalability of the Pulsed Supercritical Heat Pump make it ideal for modern data centers. Whether cooling a small cluster or a large facility with tens of thousands of GPUs, the system can be easily integrated and scaled as needed.

4. Reduced Carbon Footprint: With its energy-efficient design, the Pulsed Supercritical Heat Pump helps data centers lower their environmental impact by reducing the energy required for cooling. The use of CO2, a non-toxic, non-flammable, and environmentally friendly working fluid, makes the system an eco-conscious choice for sustainable operations.

Substantial Savings for Data Centers

For large-scale data centers with thousands of Nvidia A100 GPUs, the Pulsed Supercritical Heat Pump can result in millions of dollars in energy savings annually. For example, in a data center with 50,000 Nvidia A100 GPUs, the system can reduce energy consumption by up to 3.75 MW, saving up to $3.285 million per year in cooling costs alone.

By reducing reliance on mechanical cooling systems, which require significant energy for fans, pumps, and compressors, the Pulsed Supercritical Heat Pump enables data centers to operate more efficiently, with lower cooling-related energy consumption and fewer maintenance requirements.

About Infinity Turbine

Infinity Turbine is a pioneering company dedicated to developing innovative energy solutions that harness waste heat and other renewable energy sources. With a focus on Organic Rankine Cycle technology, Infinity Turbine offers a range of customizable turbines and energy systems designed to improve efficiency and sustainability across various industries.

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